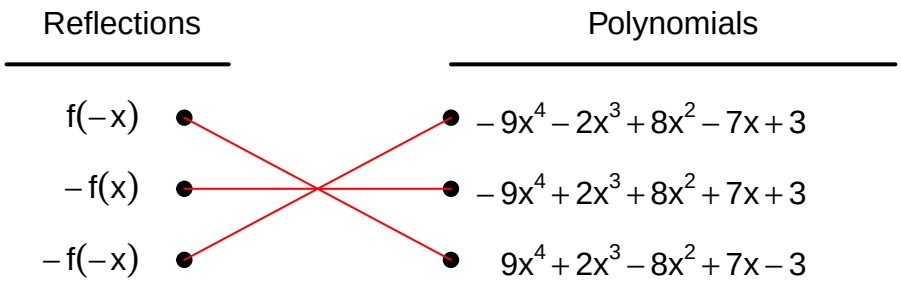
Name: Date:

Exam: Function Reflections (Solution version 28)

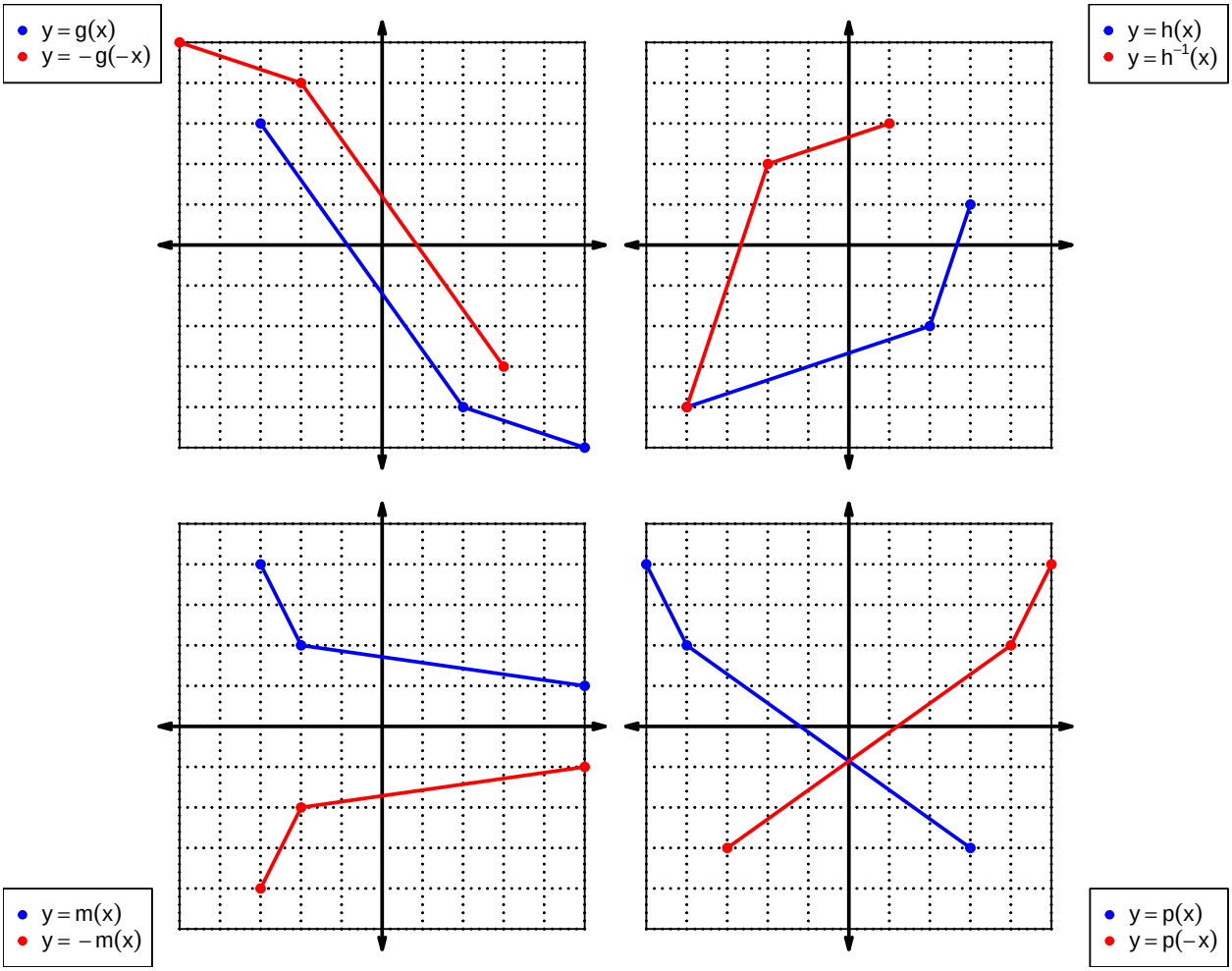
1. Let function f be defined by the polynomial below:

$$f(x) = 9x^4 - 2x^3 - 8x^2 - 7x - 3$$

Draw lines that match each function reflection with its polynomial:



2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	6	4	2
2	4	2	6
3	9	8	7
4	3	3	9
5	7	5	3
6	5	9	8
7	1	6	4
8	2	7	5
9	8	1	1

3. Evaluate $h(7)$.

$$h(7) = 4$$

4. Evaluate $g^{-1}(9)$.

$$g^{-1}(9) = 6$$

5. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-8)$?

If function h is odd, then

$$h(-8) = -5$$

6. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-5)$?

If function f is even, then

$$f(-5) = 7$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) = -x^3 - x$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^3 - (-x)$$
$$p(-x) = x^3 + x$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(x^3 + x\right)$$
$$-p(-x) = -x^3 - x$$

   c. Is polynomial p even, odd, or neither?

   odd

   d. Explain how you know the answer to part c.

   We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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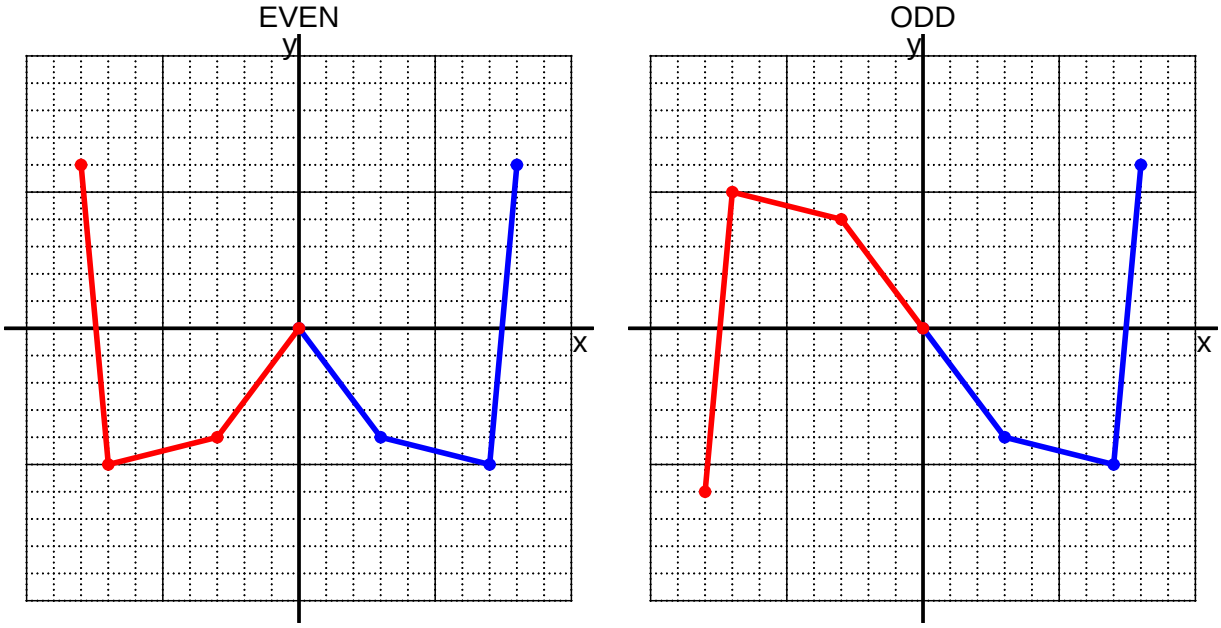
8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = \frac{x+5}{6}$$

a. Evaluate $f(85)$.

step 1: add 5
step 2: divide by 6

$$f(85) = \frac{(85)+5}{6}$$
$$f(85) = 15$$

b. Evaluate $f^{-1}(8)$.

step 1: multiply by 6
step 2: subtract 5

$$f^{-1}(x) = 6x - 5$$
$$f^{-1}(8) = 6(8) - 5$$
$$f^{-1}(8) = 43$$

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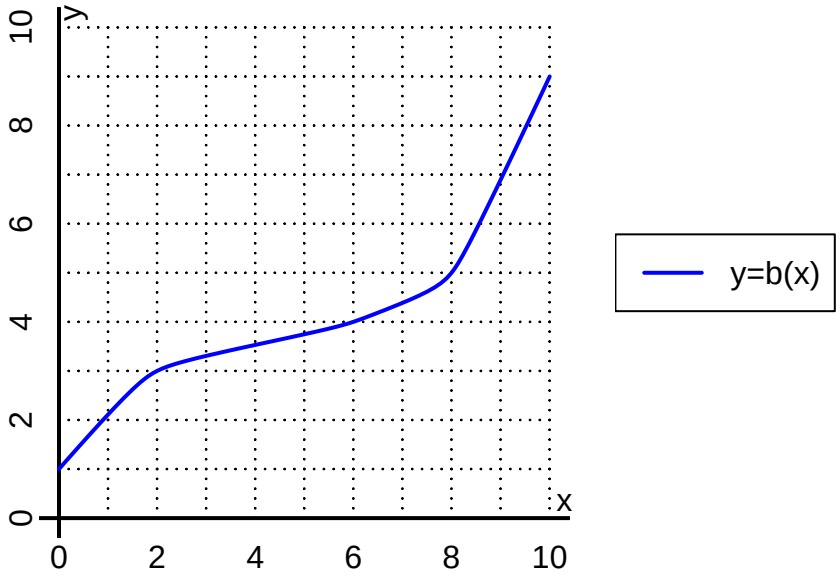
10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(6)$.

$b(6) = 4$

b. Evaluate $b^{-1}(5)$.

$b^{-1}(5) = 8$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-8	8	-8	8
-1	-9	9	9	-9
0	0	0	0	0
1	9	-9	-9	9
2	-8	8	-8	8

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.